REFERENCE ONLY
THIS BOOK MAY NOT BE
TAKEN OUT OF THE LIBRARY

METHODOLOGY FOR IDENTIFYING SENSITIVE AREAS (URBAN WASTE WATER TREATMENT DIRECTIVE) AND DESIGNATING VULNERABLE ZONES (NITRATES DIRECTIVE) IN ENGLAND AND WALES

CONTENTS	PARAS	PAGE
Chapter 1 Introduction and consultation arrangements	1.1 - 1.5	2
Chapter 2 Provisions of the UWWT Directive relevant to the identification of sensitive areas	2.1 - 2.8	4
Chapter 3 Provisions of the Nitrates Directive relevant to the designation of vulnerable zones	3.1 - 3.11	6
Chapter 4 General considerations arising from both Directives	4.1	9
Chapter 5 Surface Freshwaters (used for abstraction of drinking water)	5.1 - 5.8	12
Chapter 6 Eutrophic waters	6.1 - 6.3	14
Chapter 7 Groundwaters	7.1 - 7.3	16
Chapter 8 Refinement of Boundaries	8.1 - 8.4	17
ANNEX A List of Working Group members		18
ANNEX B Government Response to Comments Received on First Consultation Paper		20
ANNEX C List of consultees		37
ANNEX D Text of UWWT Directive		47
ANNEX E Text of Nitrates Directive		60

1 INTRODUCTION and CONSULTATION ARRANGEMENTS

Introduction

1.1 This consultation paper seeks comments on proposals made by a Working Group under the Chairmanship of the Department of the Environment. A full list of members of the Working Group is at Annex A. The proposals relate to the methodology to be employed in identifying sensitive areas and vulnerable zones as required respectively by the EC's Urban Waste Water Treatment (UWWT) and Nitrates Directives.

Relationship of first consultation paper to second consultation paper

1.2 This is the second consultation paper about the implementation of these two Directives. The authors of this consultation paper published the first one in March last year. It concerned the criteria and procedures for identifying sensitive areas and less sensitive areas as required by the UWWT Directive and criteria and procedures for identifying "polluted waters" as required by the Nitrates Directive. Following consideration of comments received at that time, the criteria proposed in that paper have been modified. The final criteria are published at Annex B to this paper, which also contains some explanation of the context in which the Directives are set, in relation to pollution control legislation in the UK generally. These criteria are being used by the regulatory authorities in order to propose "candidate" sensitive areas, less sensitive areas and polluted waters to the Secretaries of State and the Minister of Agriculture. The Directives require any such waters to be identified by December 1993.

1.3 Put simply, the first paper concerned itself with ascertaining the most effective way to identify the waters which qualify for consideration as being in need of protection according to the terms of either or both Directives. This paper deals with the process for deciding the physical limits to waters which should be formally identified under the respective Directives. It also considers whether discharges to these waters require more stringent treatment under the UWWT Directive; and whether land areas draining into such waters should be designated as vulnerable zones under the Nitrates Directive.

Arrangements for submitting comments

1.4 Comments are invited on all but the Annexes to the paper (the substance of Annex B was the subject of the previous consultation exercise), both from the individuals and organisations to whom it is addressed and from other interested parties. A full list of consultees, including both those to whom the first consultation paper was originally sent and those who later requested copies, is given in Annex C. Comments should be sent to Mrs S J French, the Department of the Environment, Water Quality Division, Room A4.17, Romney House, 43 Marsham Street, London SW1P 3PY (Telephone: 071-276 8039) to arrive no later than Wednesday 5 May 1993. Comments from Welsh organisations should be copied to Miss E Read, Welsh Office, Environment Division, New Crown Building, Cathays Park, Cardiff, CF1 3NQ (Telephone: 0222 82 3192).

Publicity and confidentiality

1.5 The Departments will be grateful if respondents will indicate whether they are making their comments public, and (if not) whether they wish their responses to be treated as confidential. Unless they so request, the Departments will assume that, if it proves to be appropriate, the responses may be made public by depositing copies in the Departments' libraries or the libraries of the Houses of Parliament or otherwise. In any event, the responses may be summarised or used in statistical work in a way which does not identify any particular respondent.

8 REFINEMENT OF BOUNDARIES

Description of methodology for identifying area of land which drains into polluted waters.

8.1 Land which drains into polluted surface waters will be identified by the NRA using available data taking account of the hydrological catchment boundary. For the purposes of initial (1993) designation of vulnerable zones, the provisional boundary will be related to sub-catchments based on relevant monitoring points, adjusted as appropriate to conform to hard lines such as roads and field boundaries.

8.2 The juxtaposition of polluted and unpolluted groundwaters will often be complex and ill-defined and it will not be possible to relate the origin of water below the soil zone to particular areas of land with any confidence. In such cases there would be little justification for the vulnerable zone to follow the estimated dividing line between polluted and unpolluted groundwaters. Instead the vulnerable zone boundary will be related to the area of the whole aquifer or relevant section of an aquifer, where a substantial part is polluted. Again, the boundary will be adjusted to conform to hard lines.

8.3 The vulnerable zone will consist of any agricultural area which, according to available evidence, is contributing to the pollution. Agricultural areas which lie within the catchment boundary but which do not contribute to the pollution shall be excluded from the vulnerable zones. These will be significant areas such as rough grazing which available evidence indicates will not be contributing to nitrate pollution. The vulnerable zone will be adjusted as necessary to take account of the need for flexibility in circumstances such as those mentioned in paragraph 5.8.

8.4 By the time that the action programmes are established, in 1995, any additional monitoring will have been carried out and new boundaries of the vulnerable zones will need to be fixed on the basis of the revised polluted waters and revised catchment boundaries.

ANNEX A

THE URBAN WASTE WATER TREATMENT AND NITRATES DIRECTIVES SUB-GROUP

The Department of the Environment has set up separate Implementation Groups to oversee the implementation in the UK of the Urban Waste Water Treatment Directive and the Nitrates Directive. It has been the practice to set up sub-groups of either or both of these Implementation Groups to look in detail at particular issues requiring a degree of expertise of one kind or another. The membership of the sub-groups varies according to the issues to be addressed and is normally drawn from the main Implementation Group(s) as well as others with relevant expertise.

The sensitive and less sensitive areas working group, on whose proposals both this consultation paper and the earlier one were are based, is a joint sub-group of both the Urban Waste Water Treatment directive Implementation Group and the Nitrates Directive Implementation Group. Its membership is drawn from the regulatory authorities concerned with each Directive.

Members of the Urban Waste Water Treatment and Nitrates Directives Sub-Group

Department of the Environment

Mr C Byrne (Chairman)	Head of Water Quality 1
Mrs S French (Secretary)	Water Quality 1

Welsh Office

Miss E Read	Environment Division

Ministry of Agriculture Fisheries and Food

Mr D Dawson	Head of Environmental Protection (Nutrients) Division
Mr J Archer	Agricultural Development and Advisory Service
Mr G Steel	Environmental Protection (Nutrients) Division
Dr J Portmann	Fisheries Laboratories

Scottish Office Environment Department

Mr P Wright	Engineering Water and Waste Directorate

Scottish Office Agriculture and Fisheries Department

Mr B Keith

Department of the Environment, Northern Ireland

Dr G Alexander	Water Quality

National rivers Authority

Dr P Bird	Headquarters
Dr A Skinner	Severn Trent Region
Mr I Adams	Thames Region

River Purification Boards

Dr K B Pugh	North East
Mr W Halcrow	Forth

Office of the Director General of Water Services

Mr I Whitear

GOVERNMENT RESPONSE TO CONSULTATION ON CRITERIA AND PROCEDURES FOR IDENTIFYING SENSITIVE AREAS AND LESS SENSITIVE AREAS (URBAN WASTE WATER TREATMENT DIRECTIVE) AND "POLLUTED WATERS" (NITRATES DIRECTIVE) IN ENGLAND AND WALES

1. In March 1992, the Department of the Environment, jointly with the Welsh Office and the Ministry of Agriculture, Fisheries and Food, published a consultation paper about the criteria and procedures for identifying sensitive areas and less sensitive areas (Urban Waste Water Treatment Directive) and "polluted waters" (Nitrates Directive) in England and Wales. Separate consultation papers on the same lines were issued in Scotland and Northern Ireland.

2. In all, about 50 responses were received and, following consideration of the points made in them by the Working Group which drew up the original proposals, the criteria have been revised as set out in the following pages. These revised criteria will form the basis on which the UK will identify sensitive and less sensitive areas as required by the Urban Waste Water Treatment Directive and "polluted waters" as required as a first step towards designating "vulnerable zones" under the Nitrates Directive. As this is the first attempt to lay down such criteria they will need to be refined as new methods of monitoring become available.

3. The original consultation paper gave something of the background of each of the two Directives and their "interaction". It did not, however, set them into their context in the system of pollution control in the UK in general. It may therefore be helpful to readers to understand something of this relationship. This may help to demonstrate that, if particular waters are not found to be polluted in the terms of the Nitrates Directive, or are identified as "less sensitive" in the terms of the Urban Waste Water Treatment Directive, this does not indicate any lack of concern about the condition of those waters in a wider sense.

4. The failure to provide a proper explanation of the context of the Directives may also explain why some of the comments received during consultation were outside the scope of the Directives, insofar as, for example, they sought "sensitive area" status for particular geographic locations which may, perhaps, suffer from some form or degree of pollution, but which may not meet the criteria for identification addressed by these particular Directives. It would also be inappropriate to identify as "sensitive" all waters meeting the proposed criteria,

regardless of the existence of a qualifying sewage discharge, as such an identification could have no practical effect in relation to any other kind of discharge or activity not addressed by the UWWT Directive.

5. Some of the concerns addressed in responses related to matters which are themselves the subject of other EC Directives. For example, the protection of designated shellfish waters. In such cases, the UWWT Directive does include a provision to identify a sensitive area if the norm of secondary treatment is unlikely to fulfil the requirements of other Directives. However, the Shellfish Waters Directive will, in general, be the appropriate vehicle for safeguarding the condition of such waters. In respect of Directives such as those concerning the conservation of the habitats of wild flora and fauna and wild birds, where no numeric standards are set in relation to pollutants, it will be necessary to carefully consider whether a sensitive area should be identified in order to protect a habitat.

6. Action taken under the terms of the Directives, to improve the quality of waters which fail their mandatory standards, will be reinforced in the UK by consenting procedures. The National Rivers Authority set standards for discharges tailored to individual circumstances, in order to safeguard uses of individual receiving watercourses. In order to protect the high quality of rivers in many parts of the country, consent standards are already set for different types of discharge at levels tighter than those required by specific EC Directives. This will continue to be the case; and consenting procedures will continue to ensure that any discharges from small sewage treatment works which are not subject to specific requirements under the UWWT Directive will continue to require "appropriate treatment".

7. In England and Wales, the setting of individual consents has for many years been facilitated by a system of quality objectives for rivers, which enables the standards set for discharges to be tailored to the achievement of specific environmental goals. Building on this existing system, DOE and the Welsh Office [have recently] consulted on proposals to implement the provisions in the Water Resources Act 1991 for setting statutory water quality objectives. These, to be set gradually from 1993, are intended to provide a firmer framework for water quality, according to the specific uses to which individual stretches of water are intended to be put.

8. One of the consultation paper's aims was to seek a measure of agreement on an expanded and more scientific definition of "eutrophic". The legal definition of "eutrophication" given in the Urban Waste Water Treatment (UWWT) Directive is

> "the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant

CRITERIA FOR FRESHWATERS SUBJECT TO EUTROPHICATION

21. One factor which is an essential precursor to eutrophication is the presence of nutrients in sufficient quantity to support sustained algal and macrophyte growth. The nutrient which controls the production in most freshwaters is phosphorus and it is known as the limiting nutrient. Rooted plants obtain most, or all, of their phosphorus from sediments via the root system, whereas nitrogen may be obtained directly from the water. However, nitrogen in rivers is unlikely to be a limiting factor for macrophyte growth, although it can be limiting in certain circumstances, usually in oligotrophic waters. Specific rules cannot be derived for these exceptional circumstances. The Regulators will need to consider them on a case by case basis.

22. Depending on the other factors, accelerated growth of algae and macrophytes may take place. The results of the accelerated growth and increase in biomass could give rise to some measurable effects in the water body concerned. These effects include marked diurnal fluctuations in rivers in dissolved oxygen concentrations and pH value, increased overnight carbon dioxide concentrations, increases in discolouration and turbidity, and enrichment of sediments with organic matter.

Still Freshwaters

23. The OECD carried out a review of eutrophication problems in standing freshwaters. The results of this review were published in "Eutrophication of Waters: Monitoring, Assessment, and Control", (OECD, Paris, 1982).

24. This report concluded that the eutrophication process could be described using a number of parameters, the most useful of which were:-

(a) Total phosphorus concentration.

(b) Chlorophyll *a* concentration.

(c) Secchi disc depth. (A measure of light penetration).

The report considered that a water has a greater than 50% probability of being eutrophic where the annual average (geometric mean) total phosphorus concentration is greater than 50µg/l. The corresponding figure for annual average chlorophyll *a* concentration is 9 µg/l, for peak chlorophyll *a* concentration 30 µg/l, and for Secchi disc transparency 3 m. (All geometric means).

25. Total phosphorus measures the "pool size" of phosphorus and is also generally the best estimator of bioavailable phosphorus. Furthermore the use of total phosphorus concentrations in still waters is necessary for conformity with the OECD model database.

This determinant will be adopted for assessment of the trophic status of lakes.

26. A number of symptoms are also useful in characterising the trophic state of freshwaters, for example increase in colour, changes in abundance and diversity of biota, the formation of exceptional scums and blooms, production of algal toxins, and fish kills due to toxins or low dissolved oxygen.

Running Freshwaters

27. The identification of parameters for the assessment of eutrophication in rivers and streams is complex. Most effort has been directed at determining phosphorus concentrations below which nuisance growths will not occur. Total phosphorus concentrations of 30µg/l (monthly mean)[a], 30µg/l (annual mean)[b] and 100µg/l (maximum concentrations)[c] have all been proposed as levels which would prevent any plant 'nuisance' arising. Significant plant growth related problems in British rivers have been associated with orthophosphate (PO_4-P) concentrations in excess of 100µg/l PO_4-P[d]. There are examples of severe effects at levels in excess of 1000µg/l PO_4-P[d,e,f].

28. The diversity of measurements and proposals illustrates the difficulty of quantifying nutrient enrichment liable to cause adverse effects in flowing waters. Not only are effects mediated by physical factors and innate variability in concentration but algae also have the ability to assimilate and store excess phosphorus further complicating evaluation of causal relationships.

29. The historical database in UK on phosphorus concentrations in rivers is based on orthophosphate analyses (PO_4-P). Furthermore this form is more relevant than "pool" phosphorus in the transient conditions of rivers. For these reasons the assessment of running waters in the United Kingdom will be based upon measurements of orthophosphate in conjunction with the other

---

[a] Clyde River Purification Board (1989), "Eutrophication in flowing waters." Technical Report No 92, Technical Report No 92, Clyde RPB, Rivers House, East Kilbride.

[b] Cartwright N.G and Painter H. (1991). "An Assessment of the environment quality standards for inorganic nutrients necessary to prevent eutrophication". Draft Report No.2397, WRC plc, Medmenham, Buckinghamshire.

[c] Mackenthun, K.M (1973). "Towards a cleaner aquatic environment". U.S Environmental Protection Agency, Washington D.C.

[d] Pitcairn C.E.R and Hawkes H.A (1973). "The role of phosphorus in the growth of Cladophora". Water Research 7pp 159-171.

[e] Fouracre V.A. and Price P.C. (1985). "Factors affecting the growth of Cladophora in Rivers". Final Report to the Department of the Environment in respect of Contract No PECD7/7086-159/82 November 1985.

[f] Forth River Purification Board (1990) "River Almond Modelling Group progress report to March 1990". Forth RPB Report No. FC08/89.

factors described. Whilst there are relatively few references linking excessive growth of rooted algae and macrophytes with phosphorous concentrations (Para 17) operational observations have indicated that concentrations between 50 and 600 µg/l PO_4-P can give rise to problems with Cladophora. Therefore, an indicative orthophosphate level of 100µg/l P as an annual average concentration is proposed.

30. In rivers affected by planktonic algae, chlorophyll *a* concentrations may be measured as for standing waters. There is no good database to indicate concentrations at which chlorophyll *a* levels in rivers may be assumed to indicate eutrophic conditions.

31. The measurement of chlorophyll *a* concentrations in the water column will not be appropriate for those nutrient enriched rivers where attached algae, particularly Cladophora, are the main problem. The quantification of attached algal biomass in rivers is possible but the techniques are difficult and costly. Estimates of the percentage cover of algae could provide a useful estimate of biomass.

32. Daytime DO levels above 150% saturation are an indication of excess growth occurring and hence of the possibility of eutrophication. Excessive growth of planktonic or attached algae, or rooted macrophytes will usually give rise to exaggerated diurnal dissolved oxygen cycles from normal levels in rivers. Photosynthesis during daylight may produce dissolved oxygen saturations above 150%, whilst respiration may reduce nighttime saturations to near zero. This can be the easiest and most reliable measure of eutrophication in flowing waters.

33. All three parameters can be used to indicate whether a river is eutrophic or potentially eutrophic, thus:-

(a) phosphate concentrations will indicate which rivers are susceptible to severe eutrophication

(b) biomass of attached algae and macrophytes will indicate the extent of growth, chlorophyll *a* concentrations will indicate the extent of planktonic algal growth, where relevant

(c) dissolved oxygen diurnal cycles will integrate the combined effects of all algae and macrophytes and describe the severity of eutrophication.

In rivers having a true phytoplankton responsible for producing the adverse effects of eutrophication, a consideration of reproduction rates and retention time within the river system may be important.

34. Even when all these conditions have been satisfied final decisions on the identification of sensitive areas can only be taken by examining local conditions.

Still Freshwaters

35. The criteria to be considered in assessing eutrophication in still freshwaters are as follows:

(a) *Phosphorus concentrations*

An annual average (geometric mean) total phosphorus concentration of greater than 50 µg/l (1).

(b) *Chlorophyll a concentrations*

Peak chlorophyll *a* concentrations of greater than 30 µg/l (1).

(c) *Water clarity*

An annual average (geometric mean) Secchi disc transparency of less than 3m (1), due to algal biomass (water colour predominantly green).

(d) *Dissolved oxygen*

Excessive supersaturation of surface layers and decreased saturation in deeper stratified layers (hypolimnion)

(e) *Effects on fauna*

Adverse changes in diversity and abundance of invertebrates and fish fauna which can be attributed to the effects of nutrient enrichment.

(f) *Effects on macroflora*

Substantial adverse changes in macrophyte abundance and diversity.

(g) *Effects on microflora*

Exceptional increases in plankton, floating or attached algal biomass leading to blooms, scums, or discolouration

---

(1) Numeric values are given only as indicators of possible current or future problems. They are neither limits above nor below which a state of eutrophication will have been demonstrated to be present or absent.

Running Freshwaters

36. The criteria to be considered in assessing eutrophication in running freshwaters are as follows:

(a) *Phosphorus Concentration*

An annual average orthophosphate concentration over 100 µg/l P (1).

(b) *Algal Biomass*

A high percentage cover of attached algae, especially Cladophora. Planktonic algae producing annual mean concentrations of more than 25 µg/l (1) chlorophyll *a* or a maximum of 100µg/l (1).

(c) *Water Retention Time*

In rivers affected by planktonic algae, sufficient retention time for algal multiplication (normally over 5 days).

(d) *Dissolved Oxygen*

A strong diurnal cycle of dissolved oxygen saturation, daytime supersaturation levels (over 150%) and reduced nighttime saturation levels.

(e) *Effects on Fauna*

Adverse changes in diversity and abundance of invertebrates and fish fauna which can be attributed to the effect of nutrient enrichment.

(f) *Effects on Macroflora*

Substantial adverse changes in macrophyte abundance and/or diversity.

(g) *Effects on Microflora*

Exceptional increases in planktonic, floating, or attached algal biomass leading to blooms, scums or discolouration.

---

(1) Numeric values are given only as indicators of possible current or future problems. They are neither limits above nor below which a state of eutrophication will have been demonstrated to be present or absent.

CRITERIA FOR GROUNDWATERS - NITRATES DIRECTIVE

Background

37. The requirement to identify groundwaters which are affected by pollution or could be affected by pollution relates only to the Nitrates Directive. The NRA will set out monitoring requirements for groundwaters at sampling stations representative of the aquifers. These may be sampled and analysed by the relevant Water Company and the data included in the assessment if the NRA is satisfied with the sampling and analytical procedures.

38. A step by step procedure has been devised for identifying groundwaters which should be considered as polluted waters. The rationale behind this procedure is explained in the Appendix. The procedure involves the following six steps.

(a) Identify all groundwater sources with levels in excess of 50mg/l or a positive linear nitrate trend. In many cases the exercise can be done reliably by inspection of data on a graph. For more variable data, typically from fissured rock, statistical smoothing of the data will be needed before the trend can be interpreted. Ideally, five to ten years data is necessary to make a reliable judgement.

(b) Reject all those sources which, by linear extrapolation, are not projected to have a nitrate concentration in excess of 50 mg/l by 2010. This date has been chosen on the basis that a 20-year extrapolation is the most that can be done with any credibility, recognising that there will be ample time to review.

(c) Reject all those sources where factors other than agricultural land use play a determining role, eg sources influenced primarily by urban areas.

(d) For the remaining sources identify the size and general dimensions of the catchment area. From available records of land use and research data on nitrate leaching estimate the equilibrium nitrate leaching from the current land use. By relating this to effective rainfall an estimate of the likely equilibrium nitrate concentration in the aquifer can be made.

(e) Those sources where the expected equilibrium nitrate concentration is 45 mg/l nitrate or less can be rejected. The date of reaching a state of equilibrium will, however, vary according to local circumstances and could be much later than 2010.

(f) The remainder are candidates for consideration as polluted waters and it will be necessary to repeat step (d) with more precise catchment boundaries and with more reliable land use data in order to refine the list.

Approach being adopted

39. Steps 38 (a) and (b) will be carried out by the NRA who will identify the area and shape of the catchments in question along with effective rainfall. MAFF will make a broad estimate of nitrate leaching from the known land use. For those catchments which remain candidates after the application of the three "filters" described in (b), (c), and (d) + (e), more reliable catchment areas and land use data will subsequently need to be established.

40. The decision taken in 1992 to reform the CAP is likely to have a significant effect on the level and methods of agricultural production in the EC. It is not possible to predict the effect of these changes on the rate of nitrate accumulation in groundwater sources, but some assessment of this will need to be taken in deciding on the identification of polluted groundwater.

LESS SENSITIVE AREAS - UWWT DIRECTIVE

Directive's Requirements

41. The UWWT Directive allows Member States to apply less stringent treatment [at least primary] to discharges to less sensitive areas. This provision only applies to the following ;

(a) discharges of 2,000 to 10,000 population equivalents [pe][a] to estuaries

(b) discharges of 10,000 to 150,000 pe to coastal waters

---

[a] 1 pe (population equivalent) means the organic biodegradable load having a five-day biochemical oxygen demand (BOD5) of 60g of oxygen per day.

42. The criteria for identifying less sensitive areas are set out in Annex IIB of the Directive. The criteria cover the following:

(a) the discharge does not adversely affect the environment due to morphology, hydrology, or specific hydraulic conditions;

(b) the risk of detrimental effects in adjacent areas, particularly sensitive areas;

and the following elements should be taken into consideration:

Good water exchange, no eutrophication [or potential] and no oxygen depletion.

43. For discharges to less sensitive areas the Directive requires;

(a) the application of at least primary treatment;

(b) comprehensive studies to indicate that discharge will not adversely affect environment;

(c) monitoring and studies to verify the discharge is not adversely affecting the environment.

General Criteria

44. It is proposed that less sensitive areas will be identified where all the following circumstances obtain in estuaries:

(a) there is a discharge of between 2,000 and 10,000 pe or plans for such a discharge

(b) there is an absence of eutrophication problems in the case of an existing discharge or a predicted absence subsequent to the commencement of the discharge in the case of a new discharge

(c) dissolved oxygen concentrations in the estuary are not significantly affected by the sewage discharge

(d) the discharge does not, or is unlikely to, adversely affect the environment

(e) there are no or unlikely to be significant detrimental effects attributable to the discharge in adjacent areas including areas in other Member States.

45. It is proposed that less sensitive areas will be identified where all the following circumstances obtain in coastal waters:

(a) there is a discharge of between 10,000 and 150,000 pe or plans for such a discharge

(b) there is an absence of eutrophication problems in the case of existing discharges or a predicted absence subsequent to the commencement of the discharge in the case of new discharges

(c) the increase in nutrient, oxygen demand and organic loadings attributable to a relaxation to primary treatment will have no significant effect at one nautical mile from the discharge and will not affect adjacent areas, in particular sensitive areas

(d) the discharge does not or is unlikely to adversely affect the environment

(e) there are no or unlikely to be significant detrimental effects attributable to the discharge in adjacent areas including areas in other Member States.

46. The derogations allowed for in Article 8.5 of the Directive apply only to Portugal.

PREDICTING TRENDS IN LEVELS OF NITRATES IN GROUNDWATER

1. Nitrate concentrations in groundwater sources affected principally by changes in land practices vary with time, in a theoretical and generalised way, in an S-shaped trace (see Figure 1). The lower limb of the S relates to the nitrate level prior to the impact of the change of land activity which increases nitrate leaching. There is a rising limb of the S which starts when there is a "breakthrough" of additional surface-derived nitrate pollutants and then an upper limb where concentrations fully reflect the change in land use if land practices remain stable. The time span for this process could be up to 40 years or more.

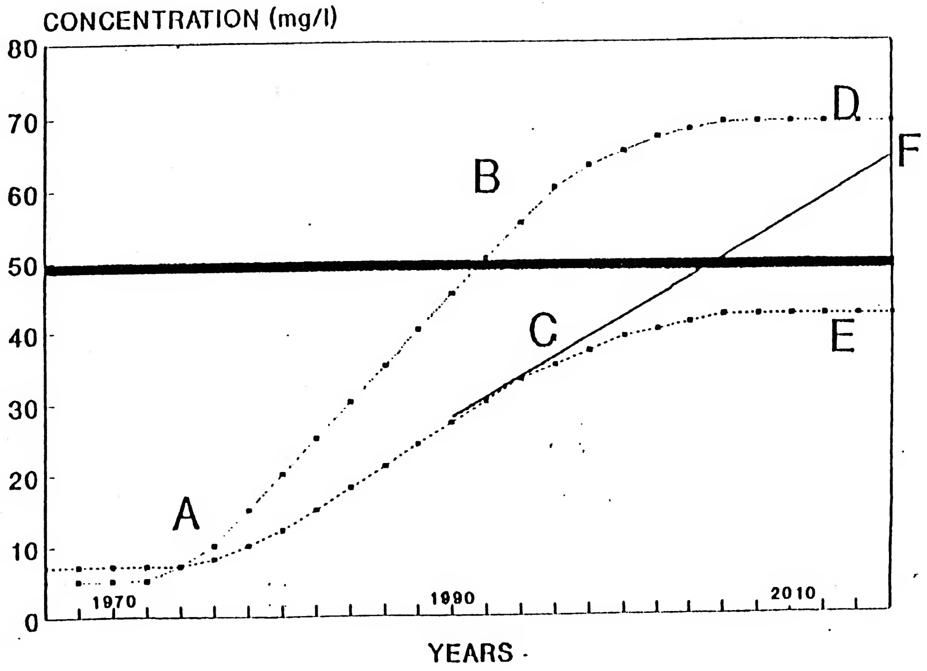
2. The slope of the rising limb is controlled by geology and hydrology. That is, there will be a faster rise rate in low porosity, high permeability aquifers with shallow water tables than in high porosity, lower permeability aquifers with deeper water tables.

3. The final concentration is determined by rainfall, abstraction patterns, and the final stable land use. If land use changes have led to reductions in nitrate leaching, the upper limit of the S will slope downwards, and a stable level of nitrate in the aquifer will not be reached until the lower concentration leachate has diluted the aquifer to its own concentration. If land use is always changing an equilibrium may never be reached. In meeting target standards for groundwater quality in such sources it is the land use which is the determining factor. Hydrogeological factors only influence how long the process will take.

4. This model is relevant to the identification of groundwaters which may be in excess of 50 mg/l at a future date unless changes are made to land use practices. Both of the sources depicted in the diagram have a rising trend and from a decision made now it is not possible to judge with confidence whether either or both will eventually exceed the limit. However, the equilibrium nitrate concentration can be estimated by analysis of the land use in the catchment to the source and a calculation of the likely nitrate leaching, as well as an estimation of the leachate reaching the aquifer and other factors affecting nitrate such as denitrification, based on research data. Such an exercise would show that source AC, although rising steeply now would not be expected to continue rising to point F but reach an equilibrium level E less than 50 mg/l. Conversely source AB, although the nitrate concentration would not be expected to climb at the same rate for ever, would reach equilibrium at a nitrate level in excess of 50 mg/l. This approach, although limited in accuracy by both scientific understanding and detail of land use data, is the best available given current knowledge.

Figure 1

PREDICTION OF NITRATE TRENDS IN GROUNDWATER SOURCES



National Rivers Authority

LIST OF CONSULTEES

Acer Consultant Ltd

ACER Environmental

Advanced Technology Evaluation Group

AEA Technology

Ministry of Agriculture Fisheries and Food

Agricultural Mortgage Corporation

Amexpark Ltd

Anglian Water Services

Dept of Architecture Planning & Estates

Ashurst Morris Crisp

Association of County Councils

Association of District Councils

Association of London Authorities

Association of Metropolitan Authorities

Baker & MacKenzie

Bedfordshire County Council
Leisure Services

Betz Limited

Bexleyheath Central Library

Birmingham City Council

BOC Limited

BOCCA

Boughton NSA Steering Group

Bournemouth & District Water Company

Bournemouth University Dept of Conservation Sciences

Branston Booths NSA Steering Group

The Brewers Society

Brighton Reference Library

Bristol Waterworks Company

British Agrochemical Association Ltd

British Association of feed Supply Manufacturers ltd

British Association of Green Crop Driers Ltd

British Ecological Society

British Egg Association

British Meat Manufacturers Association

British Nuclear Fuels plc

British Organic Farmers & Organic Growers Association

BWB Environmental & Scientific Services

British Pig Association

British Poultry Federation

BP Exploration Operating Co. Ltd

British Poultry & Meat Federation

British Rail Research

British Sugar plc

British Tissues
A Division of JAMONT (UK) Ltd

British Waterways

Bucks County Library

W & J Burness, Solicitors

Cambridge Water Company

Centre for Applied Research
Netherlands

CES Ltd

John Chadwick

Chemical Industries Association

Chester Waterworks Company

Cholderton and District Water Company

CHZMHILL Ltd

Cobham Resource Consultants

The Colne Valley Water Company

Confederation of British Industry

Co-operative Union Ltd

Corby (Northants) & District Water Company

Cory Environmental

Council for National Parks

Council for the Protection of Rural England

Country Landowners Association

Countryside Commission

Countryside Commission for Wales

Cranfield Institute of Technology, Shuttleworth College

J R Crompton Ltd

Croner Publications Ltd

The Crown Estate

Dairy Trade Federation

Dawson UK Ltd

Ministry of Defence

Denton Hall Burgin & Warrens

Derek Lovejoy Partnership

DWS (US Forces)

Dow Office Services Ltd

Dyson Bell Martin

East Anglian Water Company

Eastbourne Water Company

East Surrey Water Company

East Sussex County Council

East Worcestershire Waterworks Company

English Nature

Department of the Environment Directorate of Rural Affairs

The Environmental Advisory Unit

Environmental Control Consultancy Service

Environment Management Ltd

Essex Water Company

Farmers Union of Wales

Farming and Wildlife Advisory Group

Federation of Agricultural Cooperatives

Federation of Oils Seeds and Fats Association

Federation of Small Businesses

Fertiliser Manufacturers Association

Folkestone & District Water Company

The Food and Drink Federation

Forestry Commission

Four Elements Ltd

Friends of the Earth

GAFTA

Game Conservation Trust

Gibb Environmental Sciences

The Gin Rectifiers and Distillers Association

Gin and Vodka Association

Government Secretariat
Gibraltar

Lawrence Graham

Grand Metropolitan Foods Europe

Great Yarmouth BC Environmental Health Dept

Greenpeace

States of Guernsey Water Board

Hartlepool Water Company

Harwell Laboratory

Department of Health

HMIP

Home Grown Cereals Authority

House of Commons Library Research Division

Humberside Country Scientific Service

ICI Agrochemicals

ICI Group

ICI plc

ICI Watercare

IERC

Institute for European Environmental Policy

Institute of F W Ecology

Institute of Water and Environment Management

Isle of Man Government

Council of the Isles of Scilly

Isle of Man Water Authority

Islington Environment Forum

Jaques & Lewis

The Jersey New Water Works Company Ltd

Kent County Council

King's Lynn & West Norfolk Borough Council

Lancashire County Council

The Law Society

Lee Valley Water Company

Leeds University Library

Leicestershire Central Libraries

Dr J R Lewis

Local Government Information Bureau

London Boroughs Association

Malt Distillers Association of Scotland

The Maltsters Association of Great Britain

City of Manchester Central Library

Masons

Massie, Ludnow & Jenkins

McGrigor Donald Solicitors

Meat & Livestock Commission

Meat Industry Liaison Group

Merz and McLellan Limited

Mid Kent Water Company

Mid Southern Water Company

Mid Sussex Water Company

Milk Marketing Board

Dr P B Mistry

Mott MacDonald Consultants Ltd

NALGO

Napier Business School, Napier Polytechnic

National Agricultural Centre (RASE)

National Association of Cider Makers

National Audit Office

National Dairy Council

National Economic Research Associates

National Farmers Union

National Farmers Union (Wales)

National Federation of Anglers

National Federation of Fruit and Potato Trades

National Pig Breeders Association

National Power

The National Rivers Association

The National Sheep Association

National Trust

Natural Environment Research Council

The Newcastle & Gateshead Water Company

North Sea Working Group

North Surrey Water Company

Northumbrian Water Ltd

North West Water Ltd

Nuclear Electric Plc

Office of Water Services

Parliamentary Library, New Zealand

Portsmouth Water Company

Potato Marketing Board

Potato Processors Association

Red Wither Business Centre

Rendel Science & Environment

Rickmansworth Water Company

Ross Young's

Royal Commission on Environmental Pollution

Royal Netherlands Embassy

Royal Society for Nature Conservation

Royal Society for the Protection of Birds

The Royal Town Planning Institute

RURAL

Rural Development Commission

St George's Hospital

Scotch Whisky Association

Scott Wilson Kirkpatrick & Partners

Sea Fish Industry Authority

Seed Crushers and Oil Processors Association

Severn Trent Water Ltd

Shellfish Association of Great Britain

Simpson Curts

Sleaford NSA Steering Group

Small Farmers Association

SNACMA

Social Association

Solent Water Quality Conference

South Bedfordshire Community Health Care Trust

The South Staffordshire Water Company

Southern Water Services Ltd

South West Water Services Ltd

Stanlow Manufacturing Complex

Stone & Webster Engineering Ltd

Sunderland & South Shields Water Company

Sutton District Water Company

Tate and Lyle

Tendring Hundred Waterworks Company

Tenant Farmers Association

Terence O'Rourke Plc

Tetra Europe Ltd

Thames Water Utilities

UBS Phillips and Drew

UKASTA

Union of Independent Companies

United Kingdom Agricultural Supply Trade Association

University of Aberdeen Lighthouse Field Station

University of Oxford

University of Newcastle Upon Tyne

The University of Sheffield Faculty of Law

University of Southampton

University of Wales Cardiff Law School

The University of Wales Hugh Owen Library

University of Wales School of Mathematics

Warren Spring Laboratories

Water Companies Association

Water Research Centre

Water Services Association

Welsh Water

Wessex Water Services Ltd

West Hampshire Water Company

West Kent Water Company

Wildlife Link

Wimpey Environmental Ltd

World Health Organization

World Wide Fund for Nature

Wrexham & East Denbighshire Water Company

The York Waterworks Company

Yorkshire Water Services Ltd

II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DIRECTIVE

of 21 May 1991

concerning urban waste water treatment

(91/271/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES.

Having regard to the Treaty establishing the European Economic Community, and in particular 130s thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas the Council Resolution of 28 June 1988 on the protection of the North Sea and of other waters in the Community (4) invited the Commission to submit proposals for measures required at Community level for the treatment of urban waste water;

Whereas pollution due to insufficient treatment of waste water in one Member State often influences other Member States' waters; whereas in accordance with Article 130r, action at Community level is necessary;

Whereas to prevent the environment from being adversely affected by the disposal of insufficiently-treated urban waste water, there is a general need for secondary treatment of urban waste water;

Whereas it is necessary in sensitive areas to require more stringent treatment; whereas in some less sensitive areas a primary treatment could be considered appropriate;

Whereas industrial waste water entering collecting systems as well as the discharge of waste water and disposal of sludge from urban waste water treatment plants should be subject to general rules or regulations and/or specific authorizations;

Whereas discharges from certain industrial sectors of biodegradable industrial waste water not entering urban waste water treatment plants before discharge to receiving waters should be subject to appropriate requirements;

Whereas the recycling of sludge arising from waste water treatment should be encouraged; whereas the disposal of sludge to surface waters should be phased out;

Whereas it is necessary to monitor treatment plants, receiving waters and the disposal of sludge to ensure that the environment is protected from the adverse effects of the discharge of waste waters;

Whereas it is important to ensure that information on the disposal of waste water and sludge is made available to the public in the form of periodic reports;

Whereas Member States should establish and present to the Commission national programmes for the implementation of this Directive;

Whereas a Committee should be established to assist the Commission on matters relating to the implementation of this Directive and to its adaptation to technical progress,

HAS ADOPTED THIS DIRECTIVE:

Article 1

This Directive concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors.

---

(1) OJ No C 1, 4. 1. 1990, p. 20 and
OJ No C 287, 15. 11. 1990, p. 11.

(2) OJ No C 260, 15. 10. 1990, p. 185.

(3) OJ No C 168, 10. 7. 1990, p. 36.

(4) OJ No C 209, 9. 8. 1988, p. 3.

The objective of the Directive is to protect the environment from the adverse effects of the abovementioned waste water discharges.

Article 2

For the purpose of this Directive:

1. 'urban waste water' means domestic waste water or the mixture of domestic waste water with industrial waste water and/or run-off rain water;
2. 'domestic waste water' means waste water from residential settlements and services which originates predominantly from the human metabolism and from household activities;
3. 'industrial waste water' means any waste water which is discharged from premises used for carrying on any trade or industry, other than domestic waste water and run-off rain water;
4. 'agglomeration' means an area where the population and/or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban waste water treatment plant or to a final discharge point;
5. 'collecting system' means a system of conduits which collects and conducts urban waste water;
6. '1 p.e. (population equivalent)' means the organic biodegradable load having a five-day biochemical oxygen demand (BOD5) of 60 g of oxygen per day;
7. 'primary treatment' means treatment of urban waste water by a physical and/or chemical process involving settlement of suspended solids, or other processes in which the BOD5 of the incoming waste water is reduced by at least 20 % before discharge and the total suspended solids of the incoming waste water are reduced by at least 50 %;
8. 'secondary treatment' means treatment of urban waste water by a process generally involving biological treatment with a secondary settlement or other process in which the requirements established in Table 1 of Annex I are respected;
9. 'appropriate treatment' means treatment of urban waste water by any process and/or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and the relevant provisions of this and other Community Directives;
10. 'Sludge' means residual sludge, whether treated or untreated, from urban waste water treatment plants;
11. 'eutrophication' means the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned;
12. 'estuary' means the transitional area at the mouth of a river between fresh-water and coastal waters. Member States shall establish the outer (seaward) limits of estuaries for the purposes of this Directive as part of the programme for implementation in accordance with the provisions of Article 17 (1) and (2);
13. 'coastal waters' means the waters outside the low-water line or the outer limit of an estuary.

Article 3

1. Member States shall ensure that all agglomerations are provided with collecting systems for urban waste water,

— at the latest by 31 December 2000 for those with a population equivalent (p.e.) of more than 15 000, and

— at the latest by 31 December 2005 for those with a p.e. of between 2 000 and 15 000.

For urban waste water discharging into receiving waters which are considered 'sensitive areas' as defined under Article 5, Member States shall ensure that collection systems are provided at the latest by 31 December 1998 for agglomerations of more than 10 000 p.e.

Where the establishment of a collecting system is not justified either because it would produce no environmental benefit or because it would involve excessive cost, individual systems or other appropriate systems which achieve the same level of environmental protection shall be used.

2. Collecting systems described in paragraph 1 shall satisfy the requirements of Annex I (A). These requirements may be amended in accordance with the procedure laid down in Article 18.

Article 4

1. Member States shall ensure that urban waste water entering collecting systems shall before discharge be subject to secondary treatment or an equivalent treatment as follows:

— at the latest by 31 December 2000 for all discharges from agglomerations of more than 15 000 p.e.,

— at the latest by 31 December 2005 for all discharges from agglomerations of between 10 000 and 15 000 p.e.,

— at the latest by 31 December 2005 for discharges to fresh-water and estuaries from agglomerations of between 2 000 and 10 000 p.e.

2. Urban waste water discharges to waters situated in high mountain regions (over 1 500 m above sea level) where it is difficult to apply an effective biological treatment due to low temperatures may be subjected to treatment less stringent than that prescribed in paragraph 1, provided that detailed studies indicate that such discharges do not adversely affect the environment.

3. Discharges from urban waste water treatment plants described in paragraphs 1 and 2 shall satisfy the relevant requirements of Annex I.B. These requirements may be amended in accordance with the procedure laid down in Article 18.

4. The load expressed in p.e. shall be calculated on the basis of the maximum average weekly load entering the treatment plant during the year, excluding unusual situations such as those due to heavy rain.

Article 5

1. For the purposes of paragraph 2, Member States shall by 31 December 1993 identify sensitive areas according to the criteria laid down in Annex II.

2. Member States shall ensure that urban waste water entering collecting systems shall before discharge into sensitive areas be subject to more stringent treatment than that described in Article 4, by 31 December 1998 at the latest for all discharges from agglomerations of more than 10 000 p.e.

3. Discharges from urban waste water treatment plants described in paragraph 2 shall satisfy the relevant requirements of Annex I B. These requirements may be amended in accordance with the procedure laid down in Article 18.

4. Alternatively, requirements for individual plants set out in paragraphs 2 and 3 above need not apply in sensitive areas where it can be shown that the minimum percentage of reduction of the overall load entering all urban waste water treatment plants in that area is at least 75 % for total phosphorus and at least 75 % for total nitrogen.

5. Discharges from urban waste water treatment plants which are situated in the relevant catchment areas of sensitive areas and which contribute to the pollution of these areas shall be subject to paragraphs 2, 3 and 4.

In cases where the above catchment areas are situated wholly or partly in another Member State Article 9 shall apply.

6. Member States shall ensure that the identification of sensitive areas is reviewed at intervals of no more than four years.

7. Member States shall ensure that areas identified as sensitive following review under paragraph 6 shall within seven years meet the above requirements.

8. A Member State does not have to identify sensitive areas for the purpose of this Directive if it implements the treatment established under paragraphs 2, 3 and 4 over all its territory.

Article 6

1. For the purposes of paragraph 2, Member States may by 31 December 1993 identify less sensitive areas according to the criteria laid down in Annex II.

2. Urban waste water discharges from agglomerations of between 10 000 and 150 000 p.e. to coastal waters and those from agglomaterions of between 2 000 and 10 000 p.e. to estuaries situated in areas described in paragraph 1 may be subjected to treatment less stringent than that prescribed in Article 4 providing that:

- such discharges receive at least primary treatment as defined in Article 2 (7) in conformity with the control procedures laid down in Annex I D,
- comprehensive studies indicate that such discharges will not adversely affect the environment.

Member States shall provide the Commission with all relevant information concerning the abovementioned studies.

3. If the Commission considers that the conditions set out in paragraph 2 are not met, it shall submit to the Council an appropriate proposal.

4. Member States shall ensure that the identification of less sensitive areas is reviewed at intervals of not more than four years.

5. Member States shall ensure that areas no longer identified as less sensitive shall within seven years meet the requirements of Articles 4 and 5 as appropriate.

Article 7

Member States shall ensure that, by 31 December 2005, urban waste water entering collecting systems shall before discharge be subject to appropriate treatment as defined in Article 2 (9) in the following cases:

- for discharges to fresh-water and estuaries from agglomerations of less than 2 000 p.e.,
- for discharges to coastal waters from agglomerations of less than 10 000 p.e.

Article 8

1. Member States may, in exceptional cases due to technical problems and for geographically defined population groups, submit a special request to the Commission for a longer period for complying with Article 4.

2. This request, for which grounds msut be duly put forward, shall set out the technical difficulties experienced and must propose an action programme with an appropriate timetable to be undertaken to implement the objective of this Directive. This timetable shall be included in the programme for implementation referred to in Article 17.

3. Only technical reasons can be accepted and the longer period referred to in paragraph 1 may not extend beyond 31 December 2005.

4. The Commission shall examine this request and take appropriate measures in accordance with the procedure laid down in Article 18.

5. In exceptional circumstances, when it can be demonstrated that more advanced treatment will not produce any environmental benefits, discharges into less sensitive areas of waste waters from agglomerations of more than 150 000 p.e. may be subject to the treatment provided for in Article 6 for waste water from agglomerations of between 10 000 and 150 000 p.e.

In such circumstances, Member States shall submit beforehand the relevant documentation to the Commission. The Commission will examine the case and take appropriate measures in accordance with the procedure laid down in Article 18.

Article 9

Where waters within the area of jurisdiction of a Member State are adversely affected by discharges of urban waste water from another Member State, the Member State whose waters are affected may notify the other Member State and the Commission of the relevant facts.

The Member States concerned shall organize, where appropriate with the Commission, the concertation necessary to identify the discharges in question and the measures to be taken at source to protect the waters that are affected in order to ensure conformity with the provisions of this Directive.

Article 10

Member States shall ensure that the urban waste water treatment plants built to comply with the requirements of Articles 4, 5, 6 and 7 are designed, constructed, operated and maintained to ensure sufficient performance under all normal local climatic conditions. When designing the plants, seasonal variations of the load shall be taken into account.

Article 11

1. Member States shall ensure that, before 31 December 1993, the discharge of industrial waste water into collecting systems and urban waste water treatment plants is subject to prior regulations and/or specific authorizations by the competent authority or appropriate body.

2. Regulations and/or specific authorization shall satisfy the requirements of Annex I C. These requirements may be amended in accordance with the procedure laid down in Article 18.

3. Regulations and specific authorization shall be reviewed and if necessary adapted at regular intervals.

Article 12

1. Treated waste water shall be reused whenever appropriate. Disposal routes shall minimize the adverse effects on the environment.

2. Competent authorities or appropriate bodies shall ensure that the disposal of waste water from urban waste water treatment plants is subject to prior regulations and/or specific authorization.

3. Prior regulations and/or specific authorization of discharges from urban waste water treatment plants made pursuant to paragraph 2 within agglomerations of 2 000 to 10 000 p.e. in the case of discharges to fresh waters and estuaries, and of 10 000 p.e. or more in respect of all discharges, shall contain conditions to satisfy the relevant requirements of Annex I B. These requirements may be amended in accordance with the procedure laid down in Article 18.

4. Regulations and/or authorization shall be reviewed and if necessary adapted at regular intervals.

Article 13

1. Member States shall ensure that by 31 December 2000 biodegradable industrial waste water from plants belonging to the industrial sectors listed in Annex III which does not enter urban waste water treatment plants before discharge to receiving waters shall before discharge respect conditions established in prior regulations and/or specific authorization by the competent authority or appropriate body, in respect of all discharges from plants representing 4 000 p.e. or more.

2. By 31 December 1993 the competent authority or appropriate body in each Member State shall set requirements appropriate to the nature of the industry concerned for the discharge of such waste water.

3. The Commission shall carry out a comparison of the Member States' requirements by 31 December 1994. It shall publish the results in a report and if necessary make an appropriate proposal.

Article 14

1. Sludge arising from waste water treatment shall be re-used whenever appropriate. Disposal routes shall minimize the adverse effects on the environment.

2. Competent authorities or appropriate bodies shall ensure that before 31 December 1998 the disposal of sludge from urban waste water treatment plants is subject to general rules or registration or authorization.

3. Member States shall ensure that by 31 December 1998 the disposal of sludge to surface waters by dumping from ships, by discharge from pipelines or by other means is phased out.

4. Until the elimination of the forms of disposal mentioned in paragraph 3, Member States shall ensure that the total amount of toxic, persistent or bioaccumulable materials in sludge disposed of to surface waters is licensed for disposal and progressively reduced.

Article 15

1. Competent authorities or appropriate bodies shall monitor:

- discharges from urba waste water treatment plants to verify compliance with the requirements of Annex I.B in accordance with the control procedures laid down in Annex I.D,
- amounts and composition of sludges disposed of to surface waters.

2. Competent authorities or appropriate bodies shall monitor waters subject to discharges from urban waste water treatment plants and direct discharges as described in Article 13 in cases where it can be expected that the receiving environment will be significantly affected.

3. In the case of a discharge subject to the provisions of Article 6 and in the case of disposal of sludge to surface waters, Member States shall monitor and carry out any other relevant studies to verify that the discharge or disposal does not adversely affect the environment.

4. Information collected by competent authorities or appropriate bodies in complying with paragraphs 1, 2 and 3 shall be retained in the Member State and made available to the Commission within six months of receipt of a request.

5. Guidelines on the monitoring referred to in paragraphs 1, 2 and 3 may be formulated in accordance with the procedure laid down in Article 18.

Article 16

Without prejudice to the implementation of the provisions of Council Directive 90/313/EEC of 7 June 1990 on the freedom of access to information on the environment (¹), Member States shall ensure that every two years the relevant authorities or bodies publish situation reports on the disposal of urban waste water and sludge in their areas. These reports shall be transmitted to the Commission by the Member States as soon as they are published.

Article 17

1. Member States shall by 31 December 1993 establish a programme for the implementation of this Directive.

2. Member States shall by 30 June 1994 provide the Commission with information on the programme.

3. Member States shall, if necessary, provide the Commission by 30 June every two years with an update of the information described in paragraph 2.

4. The methods and formats to be adopted for reporting on the national programmes shall be determined in accordance with the procedure laid down in Article 18. Any amendments to these methods and formats shall be adopted in accordance with the same procedure.

5. The Commission shall every two years review and assess the information received pursuant to paragraphs 2 and 3 above and publish a report thereon.

Article 18

1. The Commission shall be assisted by a Committee composed of the representatives of the Member States and chaired by the representative of the Commission.

2. The representative of the Commission shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority laid down in Article 148 (2) of the Treaty in the case of decisions which the Council is required to adopt on a proposal from the Commission. The votes of the representatives of the Member States within the committee shall be weighted in the manner set out in that Article. The chairman shall not vote.

(¹) OJ No L 158, 23. 6. 1990, p. 56.

3. (a) The Commission shall adopt the measures envisaged if they are in accordance with the opinion of the committee.

   (b) If the measures envisaged are not in accordance with the opinion of the committee, or if no opinion is delivered, the Commission shall, without delay, submit to the Council a proposal relating to the measures to be taken. The Council shall act by a qualified majority.

If, on the expiry of a period of three months from the date of referral to the Council, the Council has not acted, the proposed measures shall be adopted by the Commission, save where the Council has decided against the said measures by a simple majority.

Article 19

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive no later than 30 June 1993. They shall forthwith inform the Commission thereof.

2. When Member States adopt the measures referred to in paragraph 1, they shall contain a reference to this Directive or shall be accompanied by such a reference on the occasion of their official publication. The methods of making such a reference shall be laid down by the Member States.

3. Member States shall communicate to the Commission the texts of the main provisions of national law which they adopt in the field governed by this Directive.

Article 20

This Directive is addressed to the Member States.

Done at Brussels, 21 May 1991.

For the Council

The President

R. STEICHEN

ANNEX I

REQUIREMENTS FOR URBAN WASTE WATER

A. Collecting systems (¹)

Collecting systems shall take into account waste water treatment requirements.

The design, construction and maintenance of collecting systems shall be undertaken in accordance with the best technical knowledge not entailing excessive costs, notably regarding:

— volume and characteristics of urban waste water,

— prevention of leaks,

— limitation of pollution of receiving waters due to storm water overflows.

B. Discharge from urban waste water treatment plants to receiving waters (¹)

1. Waste water treatment plants shall be designed or modified so that representative samples of the incoming waste water and of treated effluent can be obtained before discharge to receiving waters.

2. Discharges from urban waste water treatment plants subject to treatment in accordance with Articles 4 and 5 shall meet the requirements shown in Table 1.

3. Discharges from urban waste water treatment plants to those sensitive areas which are subject to eutrophication as identified in Annex II.A (a) shall in addition meet the requirements shown in Table 2 of this Annex.

4. More stringent requirements than those shown in Table 1 and/or Table 2 shall be applied where required to ensure that the receiving waters satisfy any other relevant Directives.

5. The points of discharge of urban waste water shall be chosen, as far as possible, so as to minimize the effects on receiving waters.

C. Industrial waste water

Industrial waste water entering collecting systems and urban waste water treatment plants shall be subject to such pre-treatment as is required in order to:

— protect the health of staff working in collecting systems and treatment plants,

— ensure that collecting systems, waste water treatment plants and associated equipment are not damaged,

— ensure that the operation of the waste water treatment plant and the treatment of sludge are not impeded,

— ensure that discharges from the treatment plants do not adversely affect the environment, or prevent receiving water from complying with other Community Directives,

— ensure that sludge can be disposed of safety in an environmentally acceptable manner.

D. Reference methods for monitoring and evaluation of results

1. Member States shall ensure that a monitoring method is applied which corresponds at least with the level of requirements described below.

   Alternative methods to those mentioned in paragraphs 2, 3 and 4 may be used provided that it can be demonstrated that equivalent results are obtained.

   Member States shall provide the Commission with all relevant information concerning the applied method. If the Commission considers that the conditions set out in paragraphs 2, 3 and 4 are not met, it will submit an appropriate proposal to the Council.

(¹) Given that it is not possible in practice to construct collecting systems and treatment plants in a way such that all waste water can be treated during situations such as unusually heavy rainfall, Member States shall decide on measures to limit pollution from storm water overflows. Such measures could be based on dilution rates or capacity in relation to dry weather flow, or could specify a certain acceptable number of overflows per year.

2. Flow-proportional or time-based 24-hour samples shall be collected at the same well-defined point in the outlet and if necessary in the inlet of the treatment plant in order to monitor compliance with the requirements for discharged waste water laid down in this Directive.

   Good international laboratory practices aiming at minimizing the degradation of samples between collection and analysis shall be applied.

3. The minimum annual number of samples shall be etermined according to the size of the treatment plant and be collected at regular intervals during the year:

— 2 000 to 9 999 p. e.:	12 samples during the first year. four samples in subsequent years, if it can be shown that the water during the first year complies with the provisions of the Directive; if one sample of the four fails, 12 samples must be taken in the year that follows.
— 10 000 to 49 999 p. e.:	12 samples.
— 50 000 p. e. or over:	24 samples.

4. The treated waste water shall be assumed to conform to the relevant parameters if, for each relevant parameter considered individually, samples of the water show that it complies with the relevant parametric value in the following way:

   (a) for the parameters specified in Table 1 and Article 2 (7), a maximum number of samples which are allowed to fail the requirements, expressed in concentrations and/or percentage reductions in Table 1 and Article 2 (7), is specified in Table 3;

   (b) for the parameters of Table 1 expressed in concentrations, the failing samples taken under normal operating conditions must not deviate from the parametric values by more than 100 %. For the parametric values in concentration relating to total suspended solids deviations of up to 150 % may be accepted;

   (c) for those parameters specified in Table 2 the annual mean of the samples for each parameter shall conform to the relevant parametric values.

5. Extreme values for the water quality in question shall not be taken into consideration when they are the result of unusual situations such as those due to heavy rain.

Table 1: Requirements for discharges from urban waste water treatment plants subject to Articles 4 and 5 of the Directive. The values for concentration or for the percentage of reduction shall apply.

Parameters	Concentration	Minimum percentage of reduction (1)	Reference method of measurement
Biochemical oxygen demand (BOD5 at 20 °C) without nitrification (2)	25 mg/l O_2	70-90 40 under Article 4 (2)	Homogenized, unfiltered, undecanted sample. Determination of dissolved oxygen before and after five-day incubation at 20 °C ± 1 °C, in complete darkness. Addition of a nitrification inhibitor
Chemical oxygen demand (COD)	125 mg/l O_2	75	Homogenized, unfiltered, undecanted sample Potassium dichromate
Total suspended solids	35 mg/l (3) 35 under Article 4 (2) (more than 10 000 p.e.) 60 under Article 4 (2) (2 000-10 000 p.e.)	90 (1) 90 under Article 4 (2) (more than 10 000 p.e.) 70 under Article 4 (2) (2 000-10 000 p.e.)	— Filtering of a representative sample through a 0,45 µm filter membrane. Drying at 105 °C and weighing — Centrifuging of a representative sample (for at least five mins with mean acceleration of 2 800 to 3 200 g), drying at 105 °C and weighing

(1) Reduction in relation to the load of the influent.

(2) The parameter can be replaced by another parameter: total organic carbon (TOC) or total oxygen demand (TOD) if a relationship can be established between BOD5 and the substitute parameter.

(3) This requirement is optional.

Analyses concerning discharges from lagooning shall be carried out on filtered samples; however, the concentration of total suspended solids in unfiltered water samples shall not exceed 150 mg/l.

Table 2: Requirements for discharges from urban waste water treatment plants to sensitive areas which are subject to eutrophication as identified in Annex II.A (a). One or both parameters may be applied depending on the local situation. The values for concentration or for the percentage of reduction shall apply.

Parameters	Concentration	Minimum percentage of reduction (1)	Reference method of measurement
Total phosphorus	2 mg/l P (10 000 - 100 000 p. e.) 1 mg/l P (more than 100 000 p. e.)	80	Molecular absorption spectrophotometry
Total nitrogen (2)	15 mg/l N (10 000 - 100 000 p. e.) 10 mg/l N (more than 100 000 p. e.) (3)	70-80	Molecular absorption spectrophotometry

(1) Reduction in relation to the load of the influent.

(2) Total nitrogen means: the sum of total Kjeldahl-nitrogen (organic N + NH_4), nitrate (NO_3)-nitrogen and nitrite (NO_2)-nitrogen.

(3) Alternatively, the daily average must not exceed 20 mg/l N. This requirement refers to a water temperature of 12° C or more during the operation of the biological reactor of the waste water treatment plant. As a substitute for the condition concerning the temperature, it is possible to apply a limited time of operation, which takes into account the regional climatic conditions. This alternative applies if it can be shown that paragraph 1 of Annex I.D is fulfilled.

Table 3

Series of samples taken in any year	Maximum permitted number of samples which fail to conform
4-7	1
8-16	2
17-28	3
29-40	4
41-53	5
54-67	6
68-81	7
82-95	8
96-110	9
111-125	10
126-140	11
141-155	12
156-171	13
172-187	14
188-203	15
204-219	16
220-235	17
236-251	18
252-268	19
269-284	20
285-300	21
301-317	22
318-334	23
335-350	24
351-365	25

ANNEX II

CRITERIA FOR IDENTIFICATION OF SENSITIVE AND LESS SENSITIVE AREAS

A. Sensitive areas

A water body must be identified as a sensitive area if it falls into one of the following groups:

(a) natural freshwater lakes, other freshwater bodies, estuaries and coastal waters which are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken.

The following elements might be taken into account when considering which nutrient should be reduced by further treatment:

(i) lakes and streams reaching lakes/reservoirs/closed bays which are found to have a poor water exchange, whereby accumulation may take place. In these areas, the removal of phosphorus should be included unless it can be demonstrated that the removal will have no effect on the level of eutrophication. Where discharges from large agglomerations are made, the removal of nitrogen may also be considered;

(ii) estuaries, bays and other coastal waters which are found to have a poor water exchange, or which receive large quantities of nutrients. Discharges from small agglomerations are usually of minor importance in those areas, but for large agglomerations, the removal of phosphorus and/or nitrogen should be included unless it can be demonstrated that the removal will have no effect on the level of eutrophication;

(b) surface freshwaters intended for the abstraction of drinking water which could contain more than the concentration of nitrate laid down under the relevant provisions of Council Directive 75/440/EEC of 16 June 1975 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (1) if action is not taken;

(c) areas where further treatment than that prescribed in Article 4 of this Directive is necessary to fulfil Council Directives.

B. Less sensitive areas

A marine water body or area can be identified as a less sensitive area if the discharge of waste water does not adversely affect the environment as a result of morphology, hydrology or specific hydraulic conditions which exist in that area.

When identifying less sensitive areas, Member States shall take into account the risk that the discharged load may be transferred to adjacent areas where it can cause detrimental environmental effects. Member States shall recognize the presence of sensitive areas outside their national jurisdiction.

The following elements shall be taken into consideration when identifying less sensitive areas:

open bays, estuaries and other coastal waters with a good water exchange and not subject to eutrophication or oxygen depletion or which are considered unlikely to become eutrophic or to develop oxygen depletion due to the discharge of urban waste water.

---

(1) OJ No L 194, 25. 7. 1975, p. 26 as amended by Directive 79/869/EEC (OJ No L 271, 29. 10. 1979, p. 44).

ANNEX III

INDUSTRIAL SECTORS

1. Milk-processing
2. Manufacture of fruit and vegetable products
3. Manufacture and bottling of soft drinks
4. Potato-processing
5. Meat industry
6. Breweries
7. Production of alcohol and alcoholic beverages
8. Manufacture of animal feed from plant products
9. Manufacture of gelatine and of glue from hides, skin and bones
10. Malt-houses
11. Fish-processing industry

31. 12. 91 Official Journal of the European Communities No L 375/1

II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DIRECTIVE

of 12 December 1991

concerning the protection of waters against pollution caused by nitrates from agricultural sources

(91/676/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 130s thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas the nitrate content of water in some areas of Member States is increasing and is already high as compared with standards laid down in Council Directive 75/440/EEC of 16 June 1975 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (4), as amended by Directive 79/869/EEC (5), and Council Directive 80/778/EEC of 15 July 1980 relating to the quality of water intended for human consumption (6), as amended by the 1985 Act of Accession;

Whereas the fourth programme of action of the European Economic Communities on the environment (7) indicated that the Commission intended to make a proposal for a Directive on the control and reduction of water pollution resulting from the spreading or discharge of livestock effluents and the excessive use of fertilizers;

Whereas the reform of the common agricultural policy set out in the Commission's green paper 'Perspectives for the common agricultural policy' indicated that, while the use of nitrogen-containing fertilizers and manures is necessary for Community agriculture, excessive use of fertilizers constitutes an environmental risk, that common action is needed to control the problem arising from intensive livestock production and that agricultural policy must take greater account of environmental policy;

Whereas the Council resolution of 28 June 1988 of the protection of the North Sea and of other waters in the Community (8) invites the Commission to submit proposals for measures at Community level;

Whereas the main cause of pollution from diffuse sources affecting the Community's waters in nitrates from agricultural sources;

---

(1) OJ No C 54, 3. 3. 1989, p. 4 and OJ No C 51, 2. 3. 1990, p. 12.

(2) OJ No C 158, 26. 6. 1989, p. 487.

(3) OJ No C 159, 26. 6. 1989, p. 1.

(4) OJ No L 194, 25. 7. 1975, p. 26.

(5) OJ No L 271, 29. 10. 1979, p. 44.

(6) OJ No L 229, 30. 8. 1980, p. 11.

(7) OJ No C 328, 7. 12. 1987, p. 1.

(8) OJ No C 209, 9. 8. 1988, p. 3.

Whereas it is therefore necessary, in order to protect human health and living resources and aquatic ecosystems and to safeguard other legitimate uses of water, to reduce water pollution caused or induced by nitrates from agricultural sources and to prevent further such pollution; whereas for this purpose it is important to take measures concerning the storage and the application on land of all nitrogen compounds and concerning certain land management practices;

Whereas since pollution of water due to nitrates on one Member State can influence waters in other Member States, action at Community level in accordance with Article 130r is therefore necessary;

Whereas, by encouraging good agricultural practices, Member States can provide all waters with a general level of protection against pollution in the future;

Whereas certain zones, draining into waters vulnerable to pollution from nitrogen compounds, require special protection;

Whereas it is necessary for Member States to identify vulnerable zones and to establish and implement action programmes in order to reduce water pollution from nitrogen compounds in vulnerable zones;

Whereas such action programmes should include measures to limit the land-application of all nitrogen-containing fertilizers and in particular to set specific limits for the application of livestock manure;

Whereas it is necessary to monitor waters and to apply reference methods of measurement for nitrogen compounds to ensure that measures are effective;

Whereas it is recognized that the hydrogeology in certain Member States is such that it may be many years before protection measures lead to improvements in water quality;

Whereas a Committee should be established to assist the Commission on matters relating to the implementation of this Directive and to its adaptation to scientific and technical progress;

Whereas Member States should establish and present to the Commission reports on the implementation of this Directive;

Whereas the Commission should report regularly on the implementation of this Directive by the Member States,

HAS ADOPTED THIS DIRECTIVE:

Article 1

This Directive has the objective of:

- reducing water pollution caused or induced by nitrates from agricultural sources and
- preventing further such pollution.

Article 2

For the purpose of this Directive:

(a) 'groundwater': means all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil;

(b) 'freshwater': means naturally occurring water having a low concentration of salts, which is often acceptable as suitable for abstraction and treatment to produce drinking water;

(c) 'nitrogen compound': means any nitrogen-containing substance except for gaseous molecular nitrogen;

(d) 'livestock': means all animals kept for use or profit;

(e) 'fertilizer': means any substance containing a nitrogen compound or nitrogen compounds utilized on land to enhance growth of vegetation; it may include livestock manure, the residues from fish farms and sewage sludge;

(f) 'chemical fertilizer': means any fertilizer which is manufactured by an industrial process;

(g) 'livestock manure': means waste products excreted by livestock or a mixture of litter and waste products excreted by livestock, even in processed form;

(h) 'land application': means the addition of materials to land whether by spreading on the surface of the land, injection into the land, placing below the surface of the land or mixing with the surface layers of the land;

(i) 'eutrophication': means the enrichment of water by nitrogen compounds, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned;

(j) 'pollution': means the discharge, directly or indirectly, of nitrogen compounds from agricultural sources into the aquatic environment, the results of which are such as to cause hazards to human health, harm to living resources and to aquatic ecosystems, damage to amenities or interference with other legitimate uses of water;

(k) 'vulnerable zone': means an area of land designated according to Article 3 (2).

Article 3

1. Waters affected by pollution and waters which could be affected by pollution if action pursuant Article 5 is not taken shall be identified by the Member States in accordance with the criteria set out in Annex I.

2. Member States shall, within a two-year period following the notification of this Directive, designate as vulnerable zones all known areas of land in their territories which drain into the waters identified according to paragraph 1 and which contribute to pollution. They shall notify the Commission of this initial designation within six months.

3. When any waters identified by a Member State in accordance with paragraph 1 are affected by pollution from waters from another Member State draining directly or indirectly in to them, the Member States whose waters are affected may notify the other Member States and the Commission of the relevant facts.

The Member States concerned shall organize, where appropriate with the Commission, the concertation necessary to identify the sources in question and the measures to be taken to protect the waters that are affected in order to ensure conformity with this Directive.

4. Member States shall review if necessary revise or add to the designation of vulnerable zones as appropriate, and at last every four years, to take into account changes and factors unforeseen at the time of the previous designation. They shall notify the Commission of any revision or addition to the designations within six months.

5. Member States shall be exempt from the obligation to identify specific vulnerable zones, if they establish and apply action programmes referred to in Article 5 in accordance with this Directive throughout their national territory.

Article 4

1. With the aim of providing for all waters a general level of protection against pollution, Member States shall, within a two-year period following the notification of this Directive:

(a) establish a code or codes of good agricultural practice, to be implemented by farmers on a voluntary basis, which should contain provisions covering at least the items mentioned in Annex II A;

(b) set up where necessary a programme, including the provision of training and information for farmers, promoting the application of the code(s) of good agricultural practice.

2. Member States shall submit to the Commission details of their codes of good agricultural practice and the Commission shall include information on these codes in the report referred to in Article 11. In the light of the information received, the Commission may, if it considers it necessary, make appropriate proposals to the Council.

Article 5

1. Within a two-year period following the initial designation referred to in Article 3 (2) or within one year of each additional designation referred to in Article 3 (4), Member States shall, for the purpose of realizing the objectives specified in Article 1, establish action programmes in respect of designated vulnerable zones.

2. An action programme may relate to all vulnerable zones in the territory of a Member State or, where the Member State considers it appropriate, different programmes may be established for different vulnerable zones or parts of zones.

3. Action programmes shall take into account:

(a) available scientific and technical data, mainly with reference to respective nitrogen contributions originating from agricultural and other sources;

(b) environmental conditions in the relevant regions of the Member State concerned.

4. Action programmes shall be implemented within four years of their establishment and shall consist of the following mandatory measures:

(a) the measures in Annex III;

(b) those measures which Member States have prescribed in the code(s) of good agricultural practice established in accordance with Article 4, except those which have been superseded by the measures in Annex III.

5. Member States shall moreover take, in the framework of the action programmes, such additional measures or reinforced actions as they consider necessary if, at the outset or in the light of experience gained in implementing the action programmes, it becomes apparent that the measures referred to in paragraph 4 will not be sufficient for achieving the objectives specified in Article 1. In selecting these measures or actions, Member States shall take into account their effectiveness and their cost relative to other possible preventive measures.

6. Member States shall draw up and implement suitable monitoring programmes to assess the effectiveness of action programmes established pursuant to this Article.

Member States which apply Article 5 throughout their national territory shall monitor the nitrate content of waters (surface waters and groundwater) at selected measuring points which make it possible to establish the extent of nitrate pollution in the waters from agricultural sources.

7. Member States shall review and if necessary revise their action programmes, including any additional measures taken pursuant to paragraph 5, at least every four years. They shall inform the Commission of any changes to the action programmes.

Article 6

1. For the purpose of designating and revising the designation of vulnerable zones, Member States shall:

(a) within two years of notification of the Directive, monitor the nitrate concentration in freshwaters over a period of one year:

  (i) at surface water sampling stations, laid down in Article 5 (4) of Directive 75/440/EEC and/or at other sampling stations which are representative of surface waters of Member States, at least monthly and more frequently during flood periods;

  (ii) at sampling stations which are representative of the groundwater aquifers of Member States, at regular intervals and taking into account the provisions of Directive 80/778/EEC;

(b) repeat the monitoring programme outlined in (a) at least every four years, except for those sampling stations where the nitrate concentration in all previous samples has been below 25 mg/l and no new factor likely to increase the nitrage content has appeared, in which case the monitoring programme need be repeated only every eight years;

(c) review the eutrophic state of their fresh surface waters, estuarial and coastal waters every four years.

2. The reference methods of measurement set out in Annex IV shall be used.

Article 7

Guidelines for the monitoring referred to in Article 5 and 6 may be drawn up in accordance with the procedure laid down in Article 9.

Article 8

The Annexes to this Directive may be adapted to scientific and technical progress in accordance with the procedure laid down in Article 9.

Article 9

1. The Commission shall be assisted by a Committee composed of the representative of the Member States and chaired by the representative of the Commission.

2. The representative of the Commission shall submit to the Commission a draft of the measures to be taken. The Committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority laid down in Article 148 (2) of the EEC Treaty in the case of decisions which the Council is required to adopt a proposal from the Commission. The votes of the representatives of the Member States within the Committee shall be weighted in the manner set out in that Article. The chairman shall not vote.

3. (a) The Commission shall adopt the measures envisaged if they are in accordance with the opinion of the Committee.

(b) If the measures envisaged are not in accordance with the opinion of the Committee, or if no opinion is delivered, the Commission shall, without delay, submit to the Council a proposal relating to the measures to be taken. The Council shall act by a qualified majority.

(c) If, on the expiry of a period of three months from the date of referral to the Council, the Council has not acted, the proposed measures shall be adopted by the Commission, save where the Council has decided against the said measures by a simple majority.

Article 10

1. Member States shall, in respect of the four-year period following the notification of this Directive and in respect of each subsequent four-year period, submit a report to the Commission containing the information outlined in Annex V.

2. A report pursuant to this Article shall be submitted to the Commission within six months of the end of the period to which it relates.

Article 11

On the basis of the information received pursuant to Article 10, the Commission shall publish summary reports within six months of receiving the reports from Member States and shall communicate them to the European Parliament and to the Council. In the light of the implementation of the Directive, and in particular the provisions of Annex III, the Commission shall submit to the Council by 1 January 1998 a report accompanied where appropriate by proposals for revision of this Directive.

Article 12

1. The Member States shall bring into force the laws, regulations and administrative provisions necessary to

comply with this Directive within two years of its notification (¹). They shall forthwith inform the Commission thereof.

2. When Member States adopt these measures, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. The methods of making such a reference shall be laid down by the Member States.

3. Member States shall communicate to the Commission the texts of the provisions of national law which they adopt in the field governed by this Directive.

Article 13

This Directive is addressed to the Member States.

Done at Brussels, 12 December 1991.

For the Council
The President
J.G.M. ALDERS

(¹) This Directive was notified to the Member States on 19 December 1991.

ANNEX I

CRITERIA FOR IDENTIFYING WATERS REFERRED TO IN ARTICLE 3 (1)

A. Waters referred to in Article 3 (1) shall be identified making use, *inter alia*, of the following criteria:

1. whether surface freshwaters, in particular those used or intended for the abstraction of drinking water, contain or could contain, if action pursuant to Article 5 is not taken, more than the concentration of nitrates laid down in accordance with Directive 75/440/EEC;
2. whether groundwaters contain more than 50 mg/l nitrates or could contain more than 50 mg/l nitrates if action pursuant to Article 5 is not taken;
3. whether natural freshwater lakes, other freshwater bodies, estuaries, coastal waters and marine waters are found to be eutrophic or in the near future may become euthropic if action pursuant to Article 5 is not taken.

B. In applying these criteria, Member States shall also take account of:

1. the pyhsical and environmental characteristics of the waters and land;
2. the current understanding of the behaviour of nitrogen compounds in the environment (water and soil);
3. the current understanding of the impact of the action taken pursuant to Article 5.

ANNEX II

CODE(S) OF GOOD AGRICULTURAL PRACTICE

A. A code or codes of good agricultural practice with the objective of reducing pollution by nitrates and taking account of conditions in the different regions of the Community should certain provisions covering the following items, in so far as they are relevant:

1. periods when the land application of fertilizer is inappropriate;
2. the land application of fertilizer to steeply sloping ground;
3. the land application of fertilizer to water-saturated, flooded, frozen or snow-covered ground;
4. the conditions for land application of fertilizer near water courses;
5. the capacity and construction of storage vessels for livestock manures, including measures to prevent water pollution by run-off and seepage into the groundwater and surface water of liquids containing livestock manures and effluents from stored plant materials such as silage;
6. procedures for the land application, including rate and uniformity of spreading, of both chemical fertilizer and livestock manure, that will maintain nutrient losses to water at an acceptable level.

B. Member States may also include in their code(s) of good agricultural practices the following items:

7. land use management, including the use of crop rotation systems and the proportion of the land area devoted to permanent crops relative to annual tillage crops;
8. the maintenance of a minimum quantity of vegetation cover during (rainy) periods that will take up the nitrogen from the soil that could otherwise cause nitrate pollution of water;
9. the establishment of fertilizer plans on a farm-by-farm basis and the keeping of records on fertilizer use;
10. the prevention of water pollution from run-off and the downward water movement beyond the reach of crop roots in irrigation systems.

ANNEX III

MEASURES TO BE INCLUDED IN ACTION PROGRAMMES AS REFERRED TO IN ARTICLE 5 (4) (a)

1. The measures shall include rules relating to:

   1. periods when the land application of certain types of fertilizer is prohibited;

   2. the capacity of storage vessels for livestock manure; this capacity must exceed that required for storage throughout the longest period during which land application in the vulnerable zone is prohibited, except where it can be demonstrated to the competent authority that any quantity of manure in excess of the actual storage capacity will be disposed of in a manner which will not cause harm to the environment;

   3. limitation of the land application of fertilizers, consistent with good agricultural practice and taking into account the characteristics of the vulnerable zone concerned, in particular:

      (a) soil conditions, soil type and slope;

      (b) climatic conditions, rainfall and irrigation;

      (c) land use and agricultural practices, including crop rotation systems;

      and to be based on a balance between:

      (i) the foreseeable nitrogen requirements of the crops,
      and

      (ii) the nitrogen supply to the crops from the soil and from fertilization corresponding to:
      - the amount of nitrogen present in the soil at the moment when the crop starts to use it to a significant degree (outstanding amounts at the end of winter),
      - the supply of nitrogen through the net mineralization of the reserves of organic nitrogen in the soil,
      - additions of nitrogen compounds from livestock manure,
      - additions of nitrogen compounds from chemical and other fertilizers.

2. These measures will ensure that, for each farm or livestock unit, the amount of livestock manure applied to the land each year, including by the animals themselves, shall not exceed a specified amount per hectare.

   The specified amount per hectare be the amount of manure containing 170 kg N. However:

   (a) for the first four year action programme Member States may allow an amount of manure containing up to 210 kg N;

   (b) during and after the first four-year action programme, Member States may fix different amounts from those referred to above. These amounts must be fixed so as not to prejudice the achievement of the objectives specified in Article 1 and must be justified on the basis of objectives criteria, for example:
   - long growing seasons,
   - crops with high nitrogen uptake,
   - high net precipitation in the vulnerable zone,
   - soils with exceptionally high denitrification capacity.

   If a Member State allows a different amount under subparagraph (b), it shall inform the Commission which will examine the justification in accordance with the procedure laid down in Article 9.

3. Member States may calculate the amounts referred to in paragraph 2 on the basis of animal numbers.

4. Member States shall inform the Commission of the manner in which they are applying the provisions of paragraph 2. In the light of the information received, the Commission may, if it considers necessary, make appropriate proposals to the Council in accordance with Article 11.

ANNEX IV

REFERENCE METHODS OF MEASUREMENT

Chemical fertilizer

Nitrogen compounds shall be measured using the method described in Commission Directive 77/535/EEC of 22 June 1977 on the approximation of the laws of the Member States relating to methods of sampling and analysis for fertilizers (1), as amended by Directive 89/519/EEC (2).

Freshwaters, coastal waters and marine waters

Nitrate concentration shall be measured in accordance with Article 4a (3) of Council Decision 77/795/EEC of 12 December 1977 establishing a common procedure for the exchange of information on the quality of surface fresh water in the Community (3), as amended by Decision 86/574/EEC (4).

ANNEX V

INFORMATION TO BE CONTAINED IN REPORTS TO IN ARTICLE 10

1. A statement of the preventive action taken pursuant to Article 4.

2. A map showing the following:

   (a) waters identified in accordance with Article 3 (1) and Annex I indicating for each water which of the criteria in Annex I was used for the purpose of identification;

   (b) the location of the designed vulnerable zones, distinguishing between existing zones and zones designated since the previous report.

3. A summary of the monitoring results obtained pursuant to Article 6, including a statement of the considerations which led to the designation of each vulnerable zone and to any revision of or addition to designations of vulnerable zones.

4. A summary of the action programmes drawn up pursuant to Article 5 and, in particular:

   (a) the measures required by Article 5 (4) (a) and (b);

   (b) the information required by Annex III (4);

   (c) any additional measures or reinforced actions taken pursuant to Article 5 (5);

   (d) a summary of the results of the monitoring programmes implemented pursuant to Article 5 (6);

   (e) the assumptions made by the Member States about the likely timescale within which the waters identified in accordance with Article 3 (1) are expected to respond to the measure in the action programme, along with an indication of the level of uncertainty incorporated in these assumptions.

---

(1) OJ No L 213, 22. 8. 1977, p. 1.
(2) OJ No L 265, 12. 9. 1989, p. 30.
(3) OJ No L 334, 24. 12. 1977, p. 29.
(4) OJ No L 335, 28. 11. 1986, p. 44.